

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

April 20, 2004

TO: Internal File

FROM: Joe Helfrich, Senior Reclamation Specialist, Team lead

RE: South Crandall Federal Lease (UTU-78953), Genwal Resources Inc., Crandall Canyon, C/015/0032, Task ID #1826

SUMMARY:

On September 16, 2003 the Division received an application from Genwal resources Inc. to modify their mining and reclamation plan to include the new South Crandall Federal Lease (UTU-78953). On December 2, 2003 the Division sent the Technical Analysis document to the applicant as represented by Mr. Gary Gray. The Division received a response to the deficiencies enumerated in the Technical Analysis document on January 30, 2004. On March 18, 2004 the Division sent the Technical Analysis document to the applicant as represented by Mr. Gary Gray. The Division received a response to the deficiencies enumerated in the Technical Analysis document on April 7, 2004. The lease application encompasses 920 acres and can be located on the Rilda Canyon 7.5 minute quadrangle map in The Manti-La Sal National Forest. There is no surface disturbance associated with this lease acquisition. The applicant is currently developing portals adjacent to the existing surface facilities in order to gain access to the coal lease. This memo will include a review of the biology section of the regulations and a response to the submittal dated April 7, 2004.

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TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

VEGETATION RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.19; R645-301-320.

Analysis:

The vegetation resource information is provided for in chapter three of the MRP. Text changes for this amendment include pages 3-vi, 3-1, 3-7 through 3-9. Additional appendices include 3-16 and 3-18. Crandall Canyon contains ten vegetative communities. Six of these occurred in areas that have been disturbed. These communities were classified as cottonwood, sagebrush, mountain shrub/grassland, mixed mountain shrub/conifer/aspen, spruce/fir/aspen, and riparian. Also, portions of the disturbed area were previously disturbed. Appendix 3-1 contains details of the original vegetation sampling.

Genwal Resources Inc. committed to take aerial color infrared photographs every five years beginning in 1995 to monitor the effects of underground mining on vegetation. Photographs were taken in 1985, 89, 94 and 2000. The 1994 and 2000 photos were chosen for comparison. The evaluation was completed by Pat Collins from Mt. Nebo Scientific and included in the 2001 annual report. The conclusions suggest that there were no noticeable impacts on vegetation as a result of mining within the angle of draw.

The application also contains a report from Environmental Industrial Services about the vegetation in the riparian area. Included is a vegetation survey of north-facing slopes done in 1996 by Patrick Collins of Mt. Nebo Scientific. The current mining and reclamation plan contains vegetation information gathered in 1980 including the riparian area. One of the dominant grasses in the 1994 sampling of the riparian area was downy brome, but this grass was not present in any areas, including the previously disturbed area, before the mine was reopened. It is unlikely this grass would have invaded on its own without some disturbance.

There are 7 threatened or endangered and candidate plant species identified in the U. S. Fish and Wildlife Service October 2003 listing for Emery County. They include,

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Barneby Reed-mustard	<i>Schoenocrambe barnebyi</i>	E
Jones Cycladenia	<i>Cycladenia humilis</i> var. <i>jonesii</i>	T
Last Chance Townsendia	<i>Townsendia aprica</i>	T
Maguire Daisy	<i>Erigeron maguirei</i>	T
San Rafael Cactus	<i>Pediocactus despainii</i>	E
Winkler Cactus	<i>Pediocactus winkleri</i>	T
Wright Fishhook Cactus	<i>Sclerocactus wrightiae</i>	E

Several more sensitive species are listed for the Manti La Sal National Forest:

- Chatterley Onion *Allium geyeri chatterleyi*
- Sweet-flowered rock jasmine *Androsace chamaejasme carinata*
- Link Trail columbine *Aquilegia flavescens rubicunda*
- Bicknell Milkvetch *Astragalus consobrinus*
- Creutzfeldt-flower cryptanth *Cryptantha creutzfeldtii*
- Pinnate spring-parsley *Cymopterus beckii*
- Abajo daisy *Erigeron abajoensis*
- Carrington daisy *Erigeron carringtonae*
- Kachina daisy *Erigeron kachinensis*
- LaSal daisy *Erigeron mancus*
- Canyonlands lomatium *Lomatium latilobum*
- Canyon sweetvetch *Hedysarum occidentale* var. *canone*
- Arizona willow *Salix arizonica*
- Musine groundsel *Senecio musiniensis*
- Maguire campion *Silene petersonii*

The application has been updated to include these current listings. They are provided for in the second addendum to appendix 3-3.

There are no threatened or endangered plant species known for the area according to information from Bob Thompson of the Forest Service, and no threatened or endangered plant species were encountered in the vegetation survey. However, at least two sensitive species have been found in the general vicinity. Canyon sweetvetch (*Hedysarum occidentale* var. *canone*) is present in Huntington Canyon near the turnoff to Crandall Canyon. Intermountain bitterweed (*Hymenoxys helenioides*) has been collected in Carbon and Emery Counties in mountain brush, sagebrush, aspen, and meadow communities between 8800 and 10,700 feet elevation. The permit area probably contains suitable habitat for this species, but it is unlikely to be adversely affected.

A reference area has been established in a mountain shrub/grassland community on a south-facing slope above the mine, and one in a spruce/fir/aspen community on the north-facing slope. The South Crandall lease area is primarily in riparian and spruce/fir/aspen communities.

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Adequate numbers of samples were taken for the riparian and spruce/fir/aspen areas. However, the required sample size for the naturally-disturbed areas is 19.5 although only 12 samples were taken. Not meeting the minimum sample size is not a problem unless the applicant proposes to use the baseline information as a success standard for final bond release.

Since baseline information will be used as the revegetation success standard for the riparian areas, the application includes raw data for the riparian area sampling. This data is needed when comparing for final bond release to make a pooled standard deviation. Depending on the sampling distribution of the data, it might also be necessary to transform it, and the raw data would be needed for this purpose.

Woody plant density information is in reports from Mt. Nebo Scientific in Appendices 3-11 and 3-14. Measured woody plant densities were 11224 and 11989 per acre for the riparian and non-riparian areas respectively.

The MRP contains productivity information for the different plan communities and for the spruce/fir/aspen reference area. This information is commonly gathered using Natural Resources Conservation Service methods.

The location of the spruce/fir/aspen reference area is shown on Plate 2-4.

Findings:

The information provided is adequate to meet the requirements of this section of the regulations.

FISH AND WILDLIFE RESOURCE INFORMATION

Regulatory Reference: 30 CFR 784.21; R645-301-322.

Analysis:

Fish and wildlife information is presented in Section 3.22 and in Appendixes 3-2 and 3-3. Updates to chapter three for the new lease addition, (UTU78953) include appendixes 3-16 and 3-18 and plates 3-1, 3-2 and 4-1. The MRP also contains results from several studies, including macroinvertebrate studies done in 1980 and 1994; fish and stream investigations performed in 1982, 1983, 1994, and 1995; several raptor surveys; and a survey for all birds in the area of the current portal development. A 2003 raptor survey has been completed for the new lease addition and is included as appendix 3-16.

The current disturbed areas contain some habitat for big game animals. Primary summer ranges are on the plateaus, and most winter range areas are at lower elevations than the mine. The proposed lease application contains mostly summer range for deer and elk with some moose winter range along the north lease boundary. The proposed addition to the permit area includes critical value summer deer and elk and high value winter moose habitats.

Most of the permit area does not contain good cliff nesting habitat, but there are a few areas with golden eagle nests. A pair of eagles nested in a cliff above the mine in 1995. Raptor nests are shown on Plate 3-1A and on a map submitted as an addendum to Appendix 3-3. The map in the addendum contains results from the 1996 survey. The 2003 raptor survey is included as appendix 3-16 for the new lease area. The survey indicates that there are no active nests within ½ mile of the Lease area.

Appendix 3-3 contains a 1980 report that discusses accipiters in Crandall Canyon. The report has evidence of past nesting and hunting activity, but no birds have been found in more recent searches. However, Crandall Canyon and similar canyons in the Huntington Creek area should be considered good accipiter habitat.

A list of twenty-two bird species identified by the Fish and Wildlife Service as migratory birds of high federal interest is in Appendix 3-3. Section 3.22.21 lists seven of these species that have the potential of migrating within the region where the mine is located.

Table 5 in Appendix 3-3 has a list of reptile and amphibian species which may be found in the area according to published information. Reptiles are found throughout the permit area, but amphibians are only associated with water. The application says baseline studies in the spring of 1994 did not encounter any threatened or endangered reptiles or amphibians. More detail of this work is in an addendum to Appendix 3-2. The MRP contains studies of macroinvertebrates and fish populations in Crandall Creek from 1994. In response to comments from the Forest Service, the permittee has committed to inventory macroinvertebrate populations in the creek every three years.

Appendix 3-2 and Section 3.22.1 discuss the importance of Crandall Creek as fish habitat. One of the recommendations in a 1982 report from Walter Donaldson, regional fish manager for the Division of Wildlife Resources, was to occasionally blow up beaver dams as they tend to accumulate silt and deter upstream trout movement. However, April 1, 1996, correspondence from the Forest Service says beaver dams are rarely barriers to fish passage. Cutthroat trout spawn during high water periods in the spring when they can swim over the dams. In March 8, 1996, correspondence to the Division, Wildlife Resources said, for its size, Crandall Creek contains a significant population of resident fish and provides a significant spawning ground/nursery.

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In three years of surveys, the Division of Wildlife Resources has not found fish above a beaver pond just above the mine. However, the Forest Service in February 5, 1997, correspondence said the surveys done in 1995 were taken in late June and August and do not give any kind of picture of the function of the higher reaches of the creek for the cutthroat population. The correspondence also says the culvert would cause a significant loss of habitat and will affect the population's ability to access headwaters.

Appendix 3-10 is a memorandum from Marvin Boyer and Pete Cavalli of the Division of Wildlife Resources concerning a fish population survey done in 1996 with some data from 1994 and 1995 surveys. This document says the data strongly suggest that the middle reach of Crandall Creek, the area near the mine, is an important spawning and nursery area. It also says preliminary results of sampling for genetic study indicate the fish are a pure strain of Colorado River cutthroat trout.

Threatened or Endangered Species

There are 9 threatened or endangered and candidate wildlife species identified in a U. S. Fish and Wildlife Service October 2003 listing for Emery County. They include,

Bonytail ^{4,10}	<i>Gila elegans</i>	E
Colorado Pikeminnow ^{4,10}	<i>Ptychocheilus lucius</i>	E
Humpback Chub ^{4,10}	<i>Gila cypha</i>	E
Razorback Sucker ^{4,10}	<i>Xyrauchen texanus</i>	E
Bald Eagle ¹	<i>Haliaeetus leucocephalus</i>	T
Mexican Spotted Owl ^{1,4}	<i>Strix occidentalis lucida</i>	T
Western Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	C
Black-footed Ferret ⁶	<i>Mustela nigripes</i>	E
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	E

¹ Nests in this county of Utah.

⁴ Critical habitat designated in this county.

⁶ Historical range.

⁹ Candidate species have no legal protection under the Endangered Species Act. However, these species are under active consideration by the Service for addition to the Federal List of Endangered and Threatened Species and may be proposed or listed during the development of the proposed project.

¹⁰Water depletions from *any* portion of the occupied drainage basin are considered to adversely affect or adversely modify the critical habitat of the endangered fish species, and must be evaluated with regard to the criteria described in the pertinent fish recovery programs.

Of the 9 species, only one, the bald eagle, could potentially occur in the permit area. However, the occurrence is most likely to be migration through the area rather than nesting or roosting.

In addition to the species discussed in the application, there is also a potential to affect the threatened and endangered fish of the upper Colorado River basin through surface water depletion.

The application includes an updated list of the current T&E species for the South lease addition as a second addendum to Appendix 3-3. The appendix lists those species that may occur in Emery County and it contains a separate list of those species that are known or suspected of being in the Manti La Sal National Forest.

The MRP lists five sensitive species potentially present in the mine's area of influence. As discussed above, the Division of Wildlife Resources has recently (1997) preliminarily identified Colorado River cutthroat trout from Crandall Creek through genetic tests. However, the tests are not conclusive. If the fish in Crandall Creek are Colorado River cutthroats, it is very significant because this would be the only known population of Colorado River cutthroat trout in the Wasatch Plateau. It would indicate there is a barrier to fish passage that keeps Yellowstone cutthroats from coming up Crandall Creek from the Huntington River. The new lease acquisition would not affect the fish populations in the Crandall canyon watershed.

Another sensitive species, the goshawk, was found near the old portals in 1980. This information is contained in a wildlife inventory report for the original application. It is almost certain other goshawks nest in the permit area. The current raptor survey confirms that there are no goshawks nesting within the proposed South lease addition.

Findings:

The information provided is adequate to meet the requirements of this section of the regulations.

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MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -301-731.

Analysis:

Monitoring and Sampling Location Maps

Monitoring and sample location maps are provided for on plate 7-18.

Vegetation Reference Area Maps

The vegetation reference area maps will not be affected by the addition of the South Crandall lease; they are provided for on plate 3-2.

Findings:

The information provided in the current MRP is adequate to meet the requirements of this section of the regulations.

OPERATION PLAN

FISH AND WILDLIFE INFORMATION

Regulatory Reference: 30 CFR Sec. 784.21, 817.97; R645-301-322, -301-333, -301-342, -301-358.

Analysis:

Protection and Enhancement Plan

The only impacts to fish and wildlife would be those to habitat loss as a result of subsidence.

Crandall Creek is considered important fish habitat, and all riparian habitat is considered critical wildlife habitat. The MRP contains correspondence from the Division of Wildlife Resources discussing a wildlife protection and mitigation plan that has been developed through several months of negotiations between the permittee, Wildlife Resources, the Forest Service, Water Rights, and the Division. This plan is intended to protect the Colorado River cutthroat trout population and to mitigate for the loss of fisheries and riparian habitat.

Major points of the plan included:

1. Certain modifications would be made to Crandall Creek above the mine.
2. All the fish in the area of the culvert would be captured and transplanted to a secure and suitable temporary location. Some of these fish will be put back into Crandall Creek above the mine.
3. Alterations would be made to another stream to isolate it from other fish populations. This stream would be treated to eliminate all fish, and Colorado River cutthroats would be transplanted to it.
4. In Scad Valley, a sheep corral would be eliminated and two or three new corrals constructed. Some roads would be reclaimed to try to improve the quality of spawning habitat in this area.

Unfortunately, it is possible that moving the sheep corral and reclaiming certain roads may not result in improved stream habitat in Scad Valley Creek and would not fulfill the requirements of R645-301-333 and R645-301-358. The Forest Service and Wildlife Resources intend to monitor this section of stream to see if the project is successful.

In Section 3.23.3, the MRP contains several methods that would be used during the construction phase to protect water quality in Crandall Creek, including more frequent water monitoring and the use of straw bales and silt fences in and adjacent to the stream. The applicant developed and implemented appropriate mitigation plans with the regulatory authority. Other measures used to protect water quality are discussed in Chapter 7.

Findings:

The information provided is adequate to meet the requirements of this section of the regulations.

Endangered and Threatened Species

Of the 16 vegetative and wildlife species, one, the bald eagle, could potentially occur in the permit area. However, the occurrence is most likely to be migration through the area rather than nesting or roosting. Most threatened or endangered species that could occur in Emery County occur at lower elevations than the mine and have no habitat in the proposed permit area expansion.

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There have been no confirmed sightings of Black-Footed Ferrets in Emery County in several years.

The mine has potential, through water depletions, of adversely affecting four listed threatened and endangered fish species of the upper Colorado River drainage. The Fish and Wildlife Service requires mitigation when water depletions exceed 100 acre-feet annually. Page 7-12 and appendix 3-18 of the application describe the use of water for mining operations. Approximately 150 gpm, (242 acre/ft/yr), are used in water consumption for mining activities. In the April 7, 2004 application the applicant has stated on page 7-12 paragraph three that "This information is for hydrological analysis only. Water depletion analysis for Fish and Wildlife Service is provided in Chapter 3." This information describes the amount of water consumed in the mining process and must be included as a depletion. The statement needs to be rewritten to indicate that additional information is provided for in Chapter three. In appendix 3-18 the applicant has provided calculations to support the estimated 40 acre feet of water lost from evaporation. Item # 8, Mine Discharge, indicates that approximately 800 acre feet per year of water are discharged into Crandal Creek annually. Calculations and data must be provided to support this figure. Assuming that this figure is correct, the mine would be providing a net gain of 558 acre feet per year of water to Crandal Creek. The applicant also needs to clarify the last sentence included under Item #8. The applicant needs to support the assumption that "the water is old" and indicate that the mine water discharge is not intercepting springs or redirecting the ground water regimen.

Bald and Golden Eagles

The bald eagle could potentially occur in the permit area. However, the occurrence is most likely to be migration through the area rather than nesting or roosting. Bald eagles are common in the area during the winter and could occasionally fly through or roost in the proposed lease addition to the permit area. The raptor survey conducted in the spring of 2003 indicated that there were no golden eagle nests in the proposed lease area. The proposed mining in this lease area would have negligible effects on these birds.

Wetlands and Habitats of Unusually High Value for Fish and Wildlife

The springs and riparian areas within the proposed lease area would be considered habitats of high value for fish and wildlife. Since no surface disturbance is anticipated by this permitting action the only effects on habitat would possibly be from subsidence. Any impacts on fish and wildlife habitat due to subsidence would most likely be negligible.

Findings:

The information provided is not adequate to meet the requirements of this section of the regulations, prior to approval the applicant must provide the following in accordance with:

R645-301-333, (1) The applicant has stated on page 7-12 paragraph three that “This information is for hydrological analysis only. Water depletion analysis for Fish and Wildlife Service is provided in Chapter 3.” The information describes the amount of water consumed in the mining process and must be included as a depletion. The statement needs to be rewritten to indicate that additional information is provided for in Chapter three. **(2)** Item # 8 Mine Discharge indicates that approximately 800 acre feet of water are discharged into Crandal Creek annually. Calculations must be provided to support this figure. Assuming that this figure is correct, the mine would be providing a net gain of 558 acre feet per year of water to Crandal Creek. The applicant also needs to clarify the last sentence included under Item #8. The applicant needs to support the assumption that “the water is old” and indicate that the mine water discharge is not intercepting springs or redirecting the ground water regimen.

VEGETATION

Regulatory Reference: R645-301-330, -301-331, -301-332.

Analysis:

Vegetation should not be affected by the addition of the South Crandall lease. Genwal Resources Inc. is committed to taking aerial color infrared photographs every five years beginning in 1995 to monitor the effects of underground mining on vegetation.

Findings:

The information provided in the current MRP is adequate to meet the requirements of this section of the regulations.

MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

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Analysis:

Monitoring and Sampling Location Maps

Monitoring and sampling location maps are provided for on plate 7-18 of the application.

Findings:

The information provided in the current MRP is adequate to meet the requirements of this section of the regulations.

RECLAMATION PLAN

GENERAL REQUIREMENTS

Regulatory Reference: PL 95-87 Sec. 515 and 516; 30 CFR Sec. 784.13, 784.14, 784.15, 784.16, 784.17, 784.18, 784.19, 784.20, 784.21, 784.22, 784.23, 784.24, 784.25, 784.26; R645-301-231, -301-233, -301-322, -301-323, -301-331, -301-333, -301-341, -301-342, -301-411, -301-412, -301-422, -301-512, -301-513, -301-521, -301-522, -301-525, -301-526, -301-527, -301-528, -301-529, -301-531, -301-533, -301-534, -301-536, -301-537, -301-542, -301-623, -301-624, -301-625, -301-626, -301-631, -301-632, -301-731, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-732, -301-733, -301-746, -301-764, -301-830.

Analysis:

The reclamation plan will not be affected by the addition of the South Crandall lease. There is no surface disturbance associated with this permitting activity.

Findings:

The information provided in the current MRP is adequate to meet the requirements of this section of the regulations.

PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENTAL VALUES

Regulatory Reference: 30 CFR Sec. 817.97; R645-301-333, -301-342, -301-358.

Analysis:

For those areas disturbed by mining activities high value habitats (pinyon-juniper, agricultural and riparian areas) will be restored; in many cases, they will be enhanced beyond their premining condition. The goals are to create a diversified cover and/or habitat that will support a wide range of species while restoring to a premining condition and, where feasible, enhancing habitat. On September 21, 1993, representatives from Genwal, the Division, and Wildlife Resources met on-site to discuss wildlife habitat enhancement for reclamation. Subsequently, Wildlife Resources wrote Genwal a letter with enhancement suggestions. This letter has been incorporated in the plan, and Genwal commits to use the recommendations. They include making several rock piles and placing modified utility poles with attached nesting boxes near the perimeter of the disturbed area. These measures were felt by Wildlife Resources to be the most practical means of enhancing wildlife habitat in this area. Combined with the revegetation plan, these methods can be considered the best technology currently available.

Findings:

The information provided is adequate to meet the requirements of this section of the regulations.

CONTEMPORANEOUS RECLAMATION

Regulatory Reference: 30 CFR Sec. 785.18, 817.100; R645-301-352, -301-553, -302-280, -302-281, -302-282, -302-283, -302-284.

Analysis:

Contemporaneous reclamation will not be affected by the addition of the South Crandall lease. There is no surface disturbance associated with this permitting activity.

Findings:

The information provided in the current MRP is adequate to meet the requirements of this section of the regulations.

REVEGETATION

Regulatory Reference: 30 CFR Sec. 785.18, 817.111, 817.113, 817.114, 817.116; R645-301-244, -301-353, -301-354, -301-355, -301-356, -302-280, -302-281, -302-282, -302-283, -302-284.

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Analysis:

It should be noted that there is no surface disturbance associated with the addition of the South Crandall lease. However for those areas disturbed by mining activities topsoil will be redistributed within 30 days of completion of grading in late September or early October. Soil amendments will be applied if necessary before the end of October. Seeding will commence as soon as the seedbed is finished in the late fall. Tree planting will be done in conjunction with seeding or in the following spring as soon as the soil is workable.

The applicant commits to inoculating the soil with microorganisms prior to seeding. Some research indicates this is a necessary step for establishing certain species although there has been successful revegetation in some areas with essentially sterile soil and no attempt to inoculate. The applicant and the Division should look at current findings at the time of reclamation to determine the best methods.

The application contains a seed/planting mix for riparian and one for non-riparian areas. The seed mix for non-riparian areas was developed primarily for the south-facing slope where existing disturbances are located. The north-facing slope has a very different vegetation community, but many of the species in the existing seed/planting mixture are appropriate for the north-facing slopes. Also, the application contains a plan to transplant woody plants of species more suited to the north-facing slopes.

The seed/planting mix for riparian areas includes a mixture of species suitable for both upland and riparian areas. Willows, dogwoods or roses would be planted at one-foot intervals along the stream. In response to comments from the Forest Service, the applicant has committed to plant horsetail plugs about every two feet. Additional trees and shrubs would be planted farther away from the creek.

The seeding and planting mixes in the plan fulfill regulatory requirements for introduced species, diversity, seasonality, and the postmining land use. Three introduced species are included, and they are all highly desirable. They should not be overly competitive or displace native species in the area. Small burnet and yellow sweet clover are fairly short-lived species that will probably not be present after the ten-year extended responsibility period. The seed and planting mixes are expected to provide successful revegetation if proper reclamation methods are used.

The entire area of disturbance will be hydromulched with long fiber wood mulch. Tackifying agents will be added to the hydromulch, and the application shows tackifier application rates for varying slopes.

The applicant and the Division investigated the use of various mulches, particularly for the steep north-facing hillside. There are many types of hydromulch available, and the applicant intends to use one with coarse, long fibers. This type of mulch is preferred over a mat because mats often have erosion under them.

It is anticipated that mulch technology will change over the next several years until the site is reclaimed. The applicant will need to use the best technology currently available to control erosion and sedimentation, particularly in the area near the stream.

No irrigation is anticipated. The applicant commits to avoid using persistent pesticides and to prevent personnel-caused fires. However, a contingency irrigation plan is recommended for transplants. Dry conditions could necessitate watering transplants for the first one or two summers.

Musk thistle is a very serious problem at mid- to high elevations in Utah. Although this noxious weed is not widespread in Huntington Canyon, it has been found at the Crandall Canyon Mine. Disturbed and newly seeded areas are very prone to noxious weed invasion. The permittee should plan now for noxious weed control during reclamation as it will almost certainly be necessary.

On January 1, 1994, the Forest Service issued a closure order for any straw or hay that is not certified to be free of noxious weeds. This includes transportation across Forest Service lands. The applicant is not planning to use straw or hay mulch in reclamation, but any straw or hay bales that are used for sediment control will need to be certified.

Revegetation Success Standards

A vegetation reference area has been established in the mountain shrub/grassland community above the mine portals for comparison with vegetation on reclaimed areas that had this community before mining. Another reference area has been established to compare to areas with spruce/fir/aspen communities. This reference area is south of the portal development area.

Woody plant density standards have been established for three areas of the mine. For areas to be compared with the mountain shrub/grassland reference area, the standard for woody species density has been set at 1336 shrubs per acre. This is based on reference area data. The standard for north-facing slopes has been set at 4000 per acre based on baseline information in the plan and consultation with Wildlife Resources. The riparian area has about 11,224 shrubs and trees per acre, and shrubs and trees will be planted in this area at the rate of about 3000 per acre. It is expected that these will multiply through the extended responsibility period, and the success standard has been set at 6000 per acre.

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There are some differences between the disturbed and reference area spruce/fir/aspen communities, but they are primarily in species composition rather than the total amount of cover. The current reference area has 75.25% total living cover, and the disturbed area has 78.75%. These values are not statistically different at the 90% confidence level. The proposed disturbed area has statistically more overstory than the reference area, but understory cover values are statistically the same for both areas. Also, the woody species density is higher in the reference area.

Despite the differences between the proposed disturbed and reference areas, there are several similarities, including location, community type, soils, aspect, and total cover. The actual species present and the amount of cover from overstory vary, but these will vary even more significantly when comparing reclaimed and reference areas. Additionally, the woody plant density success standards are established in consultation with Wildlife Resources rather than being based strictly on baseline information in the plan. For these reasons, the reference area is considered an acceptable revegetation success standard for spruce/fir/aspen areas.

Portions of the north-facing slope have been affected by natural soil movement and have less vegetation than adjacent areas. The Division could accept a different revegetation success standard for these areas rather than comparing them to the spruce/fir/aspen reference area. However, the permittee has not included a separate standard in the MRP even though the report from the permittee's consultant discusses using another standard. A revegetation reference area was not proposed, and the number of samples taken in these areas is not sufficient to allow the baseline method to be used.

In order to meet the erosion control performance standards in the areas that have had soil movement, it will probably be necessary to establish nearly as much vegetation as in spruce/fir/aspen areas. The main question is whether establishing this much vegetation is feasible. The various revegetation and stabilization techniques that are planned should allow more vegetation to become established than currently exists. If, in the future, the permittee desires to propose a reference area revegetation success standard in a similar area, the Division could compare it to the area now proposed to be disturbed. If there is some possibility a different success standard may be proposed in the future, the areas with soil movement should be mapped now.

The approved MRP includes diversity standards for all disturbed areas. The standards currently in the plan are minimum and maximum relative cover values for grasses, shrubs, and broadleaf forbs in the three major disturbed vegetation types. In addition, the MRP states that no one species will make up more than 60% of the cover in its respective vegetation class except that individual species of shrubs and trees will make up no more than 80% of the density for this class. The approved MRP gives a monitoring schedule and methodologies for checking success of revegetation. In the disturbed spruce/fir/aspen areas, the standard will be 3-15% relative cover from broadleaf forbs, at least 15% cover from trees and shrubs, and the balance from grasses.

This leaves a lot of latitude between grasses and woody plants since woody plants are expected to eventually dominate the area. Until then, grasses are expected to dominate the cover.

The riparian area should be dominated by woody species. The standard is 5-10% relative cover from broadleaf forbs, 40-85% relative cover from trees and shrubs, and 10-50% relative cover from grasses and grasslike plants.

For both riparian and spruce/fir/aspen areas, as in the other areas, no one species will make up more than 60% of the cover in its respective vegetation class except that individual species of trees and shrubs will make up no more than 80% of the density for this class.

The diversity standards for south-facing slopes are based on Natural Resource Conservation Service range site potential plant community data. For riparian areas and north-facing slopes, the standards are based on professional judgment by a soil scientist and botanist with the Forest Service and a Division biologist. The standards allow some flexibility but ensure a reasonably diverse plant community.

R645-301-353.140 requires that the vegetative cover be capable of stabilizing the soil surface from erosion. The permittee intends to use the Erosion Condition Classification System to compare reclaimed areas with adjacent undisturbed areas. This method was developed by the Office of Surface Mining, and, while it is a qualitative judgment, it provides a reasonably good estimate of how stable a site is. Even if vegetative cover is equal to that of the reference area, the reclaimed area may not be stable. R645-301-356.250 says that for areas previously disturbed by mining that were not reclaimed and that are remined or redisturbed, at a minimum, the vegetative ground cover will be not less than the ground cover existing before redisturbance and will be adequate to control erosion. The vegetative ground cover existing before redisturbance was 50.3%. Relatively little of this cover was from plants that would be considered weeds. This figure has been established as the vegetative cover standard for success for the areas previously disturbed by mining.

Findings:

The information provided in the approved MRP is adequate to meet the requirements of this section of the regulations.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

TECHNICAL MEMO

Analysis:

Reclamation Monitoring And Sampling Location Maps

Reclamation monitoring and sampling location maps will not be affected by the addition of the South Crandall lease. There is no surface disturbance associated with this permitting activity

Reclamation Treatments Maps

Reclamation treatment maps will not be affected by the addition of the South Crandall lease. There is no surface disturbance associated with this permitting activity

Revegetation and Restoration of Soil Productivity

Revegetation and restoration of soil productivity will not be affected by the addition of the South Crandall lease. There is no surface disturbance associated with this permitting activity.

Findings:

The information provided in the current MRP is adequate to meet the requirements of this section of the regulations.

RECOMMENDATIONS:

There is one deficiency that needs to be addressed prior to final approval.